

The Role of Construal Level in Attentional Bias Toward Temptation

Undergraduate Research Thesis

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Abstract

Inducing a mindset of abstraction, i.e. high-level construal, increases people's performance in various measures of self-control (Fujita & Han, 2009; Fujita & Roberts, 2010; Kentaro Fujita et al., 2006). This has been found with both explicit attitudes towards tempting stimuli and evaluative associations with tempting stimuli. The current research seeks to extend this effect further, investigating whether construal level may affect automatic deployment of attention. Following work in the realm of addiction, which linked temptation strength with attentional bias, we tested whether construal manipulation may affect which objects attention is directed to. To induce high-level or low-level construal, we used the previously validated "Category – Exemplar" task (Fujita et al., 2006). To measure the effect of abstraction on attentional bias, we used Change Blindness, a paradigm in which participants spot a change made to a flickering picture. We conducted our test in the domain of food temptations. For half of the participants, the changed object was tempting (cupcake), and for the others it was neutral (mug). The aim of our research was to see if construal manipulation, changed object, and self-reported dieting status would interact to predict the attentional bias in the Change Blindness task. Results supported our prediction, as we found a three-way interaction in which dieters engaged in a high-level construal saw tempting stimuli slower than dieters in a low-level construal ($t_{(132)}=2.29, p=.0238$). A limitation to these promising results, however, is that the bulk of the interaction was found in the neutral change condition.

Introduction

Why is it that, despite knowing that they want to stop eating unhealthily or stop smoking, people continue to let temptations interfere with their long-term goals so frequently? Why do people who have sufficient skills, knowledge, and opportunities to behave in accordance with their goals still fail to resist temptations that interfere with those goals? In other words, what is self-control, and why does it fail?

As early as the 1970's, with Walter Mischel's seminal work on delay of gratification in children, self-control was a subject of much interest in social psychology. This interest only increased when follow up work suggested that the ability to delay gratification at age 4 predicted life outcomes occurring many years later such as earning, academic achievement, body mass index and even marital stability (Ayduk et al., 2000; Mischel, Shoda, & Rodriguez, 1989; Schlam, Wilson, Shoda, Mischel, & Ayduk, 2013).

Many psychologists followed a course of research directed at the inhibitory type of self-control. Using experiments that pit proximal temptations and more distant goals, they focused on conscious and effortful inhibition of impulses in the face of temptation (Heatherton & Baumeister, 1996; Hoch & Loewenstein, 1991; Muraven & Baumeister, 2000; Smith & DeCoster, 2000).

Yet, this conscious and effortful inhibition process only describes one of the many processes that people use to stop themselves from indulging in a proximal temptation that would undermine their long-term goal (Fujita, 2011). Previous research has documented many ways self-control can be achieved without

requiring the effortful inhibition of impulses. For instance, self-control can be achieved through prospective measures. An example of such behavior is a Christmas fund earning no interest that people use to protect themselves against a future lack of willpower. (Thaler & Shefrin, 1981) Another example of this lack of effortful inhibitions is when one counters impulses by creating unidirectional associations between temptations and goals, for example a dieter who is reminded of his dieting goals when he encounters chocolate cake (Fishbach, Friedman, & Kruglanski, 2003).

Construal Level

Another effective method of prioritizing long-term goals in the face of temptation is the construal level. Construal level refers to the level of abstraction with which one construes objects and situations (Liberman & Trope, 2009). For instance, the same piece of cake can be construed by a dieter in a low level, concrete manner as a delicious snack, or in a high level, abstract manner, as a deterrent to long-term, more psychologically distant goals of losing weight. Thus, high-level construal describes a mindset where the central features, the gist of the object or situation, are prioritized. A low-level construal describes a mindset where attention is paid to peripheral details that are unrelated to the gist of a situation. Importantly, engaging in a high-level construal facilitates successful self-control. Studies have shown that people can be induced into either a high-level or low-level construal, and this has been shown to affect their self-control on subsequent measures (Carnevale, Fujita, Han, & Amit, 2014; Fujita & Han, 2009; Fujita & Roberts, 2010; Fujita & Sasota, 2011; Fujita, Trope, Liberman, & Levin-

Sagi, 2006; Rogers & Bazerman, 2008). For example, Fujita et al. (2006) showed that participants rated tempting stimuli (tasty, high calorie food) more positively when induced into a low-level construal, and more negatively in a high-level construal. More recent research by Fujita and Han (2009) extends this connection to implicit attitudes, finding that those induced into a high level construal more readily associated tempting food with negativity, as measured using an implicit association test (IAT; see Carnevale et al., 2014 for similar finding).

While it is known that engendering a high level construal is an effective way of manipulating self-control success by altering cognitive processes, researchers have yet to fully discover which specific cognitive processes are affected (Fujita & Carnevale, 2012). One process that may be affected but has yet to be empirically tested is attentional bias.

Attentional Bias

If a temptation-related stimulus grabs one's attention quicker than a neutral stimulus, one can be said to have an attentional bias towards the temptation. This bias is then likely to make one more aware of temptations, increasing the chance of engaging with a temptation and experiencing self-control failure.

The attentional biases we are investigating are a product of selective attention, which asserts that among the vast amount of information available to an individual, information will be prioritized based on behavioral relevance (Driver, 2001). How we construe events determines what information we prioritize and attend to. Given that high-level construal tends to give greater weight to one's long-term goals, this should be reflected in what is "behaviorally relevant."

Although there are several paradigms that measure attentional bias, we chose the Change Blindness paradigm, as it is both easy to use and allows for a measure that is relatively unaffected by intentional choice (B. C. Jones, Jones, Blundell, & Bruce, 2002).

In a typical change blindness trial, an image flickers off and then back on with one detail in the image changed, and observers are asked to identify the change. Surprisingly, observers often fail to recognize major differences in the two images for an extended duration (Rensink, Regan, & Clark, 1997). When this paradigm is used as a measure of attentional bias, the measured variable is how long it takes a participant to identify the change in the image.

Using change blindness, an attentional bias for temptations has been connected to self-control failures. For example, Jones et al. (2002) showed substance users (alcohol or cannabis) and a control group images that included either a substance-related change or a neutral change, and tested how long it took each group to recognize the difference between images. The results showed an attentional bias for temptation-related stimuli, with the level of substance consumption predicting which images would be more salient for the different populations. Those who responded faster to the substance-related images reported higher levels of substance use (B. C. Jones et al., 2002). This effect was also found in studies measuring processing biases in other substance users (Bearre, Sturt, Bruce, & Jones, 2007; B. C. Jones et al., 2002; B. T. Jones, Bruce, Livingstone, & Reed, 2006; B. T. Jones, Jones, Smith, & Copley, 2003).

Building on the previously mentioned research, we suggest a novel route

through which construal level effects on self-control manifest. Specifically, we suggest that high-level construal leads to a change in the behavioral relevance of temptations, and therefore a change in the attentional bias towards temptations.

To test this hypothesis, we will use an established manipulation to manipulate participants' construal level (the "Category – Exemplar" task; Fujita et al., 2006), and then measure their bias towards temptation (vs. control) using a change blindness paradigm.

Methods

Design

The experimental design included two randomly assigned categorical variables and one continuous individual difference measure. Participants were randomly allocated to one of the conditions of a 2X2 between participants design: construal level (high-level construal vs. low-level construal) X change blindness (tempting vs. neutral stimulus), and their dieting status was measured as a continuous variable with the Restrained Eating Scale.

Participants

253 (139 female, mean age 37.32, SD 11.68) mechanical Turk workers located in the United States completed the experiment. Participants were paid \$0.50 for their participation in this experiment. We arrived at this number of participants because we had budget for 250 people, which, being slightly over 240 people would mean having 30 people per cell for a 2X2X2 design (assuming that roughly half of the participants would be concerned about dieting).

Procedure

All of the study instructions and tasks were administered using the Qualtrics online questionnaire infrastructure. Participants completed four tasks during the experimental session which lasted approximately 20 minutes in total. First, participants completed either a high-level or a low-level construal manipulation, the category/exemplar task. Next participants completed a change blindness task where they were exposed to a flickering image with a small change between flickers and were asked to spot the difference. Then, participants completed the Restrained Eating subscale (RES), which is a subset of the Dutch Eating Behavior Questionnaire (van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986), a dichotomous dieting question, and a subjective dieting success measure. Finally, participants filled out demographic self-report measures.

Tasks

Construal Level. Construal level was manipulated through the category – exemplar task (Fujita et al., 2006). In this task, participants are given a word and asked to come up with either a category (in the high level construal condition) or an example of the word (in the low level construal condition). For example, if the word was “dog” a category could be “animal” and an example could be “poodle”). Participants completed 40 trials of this task.

Change Blindness. In the Change Blindness task, an image was presented and then changed with a slight modification, with a mask in between. The original and changed images oscillated until the participant identified the difference. The duration that each of the images was presented was identical (250 ms), and the mask was a quick flash of an

entirely white screen in between the changing of the images that lasted 80 ms. Participants were asked to click a mouse button as soon as they recognized the difference between the images. The change used was either temptation-related (a change to an unhealthy food, Figure 1a) or neutral (a change to a neutral object, Figure 1b). After reporting that they had identified the change, participants were shown the original image again, this time presented statically, and asked to identify in which of 6 areas the change to the original image occurred (Figure 1c).

Figure 1a (cupcake changed)

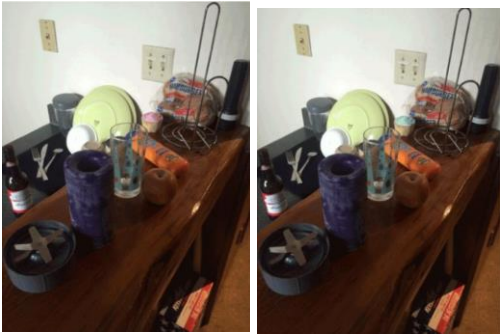


Figure 1b (mug changed)



Figure 1c



Dieting questionnaires. Several self-report measures were used to assess dieting status. We first asked participants to complete the Restrained Eating Subscale, a 10 item, well-validated questionnaire assessing the degree to which a participant has a dieting concern (e.g. “Do you try to eat less at meal time than you would like to;” van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986). We then asked participants seven items assessing their subjective dieting success (e.g. “How successful are you at watching your weight”, see Appendix for full forms of all questionnaires). We also asked a single dichotomous dieting question which read as follows: “Are you now watching what you eat in order to lose weight?” Finally, we had participants indicate their height and weight in order to obtain their body mass index.

Results

Exclusion criteria

There were 253 participants who completed the experiment. 85 participants were excluded because they failed to identify the correct region of the change in the change blindness exercise. 18 participants were excluded for incorrectly responding to more than 10% of the construal level manipulation items. Additionally, 8 participants were removed for indicating that they did not take the experiment seriously. Finally, 2 participants whose reaction time in the change blindness task was larger than the average reaction time in the task by more than three standard deviation after all other exclusion criteria were applied, were excluded. After all exclusion criteria were applied, 140 participants remained in the analyses. (47 control, 38 tempting)

Dieting measures

The Restrained Eating Subscale (9 questions, 1 – low, 5 – high scale) was highly reliable (Cronbach's alpha 0.91) with an average score of 3.01 (SD 0.84). The subjective dieting success scale (7 questions, 1 – low, 5 – high scale) was also highly reliable (Cronbach's alpha 0.88) with an average of 3.00 (SD 0.85).

Analysis

Using the Process Macro in SPSS, we conducted a multiple regression predicting change blindness RT from construal level, change blindness condition and self-reported dieting concern (Restrained Eating Subscale), as well as all interactions between these factors. The only significant results found were a main effect for change blindness condition ($t_{(132)}=-2.62$, $p=0.0098$) and a three way interaction between construal level, change blindness condition, and RES scores ($t_{(132)}=2.29$, $p=0.024$, See Figure 2 and Table 1).

To further probe the three-way interaction, we computed a separate analysis for each change condition. For the tempting change blindness condition, in the high-level construal condition, RES score was positively related to reaction time in the change blindness task ($t_{(70)}=1.46$, $p=0.1493$), and in the low-level construal condition, RES score was negatively related to reaction time in the change blindness task ($t_{(70)}=-0.759$, $p=0.4502$); however, the interaction between mean RES and construal level was not significant ($t_{(70)}=1.45$, $p=0.1511$). For the neutral change blindness condition, we found a trend for an interaction in the opposite direction ($t_{(62)}=-1.71$, $p=0.0914$). In the high-level construal condition,

RES score was negatively related to reaction time in the change blindness task ($t_{(62)}=-1.61, p=0.1116$), and in the low-level construal condition, RES score was positively related to reaction time in the change blindness task ($t_{(62)}=1.06, p=0.2943$).

Figure 2

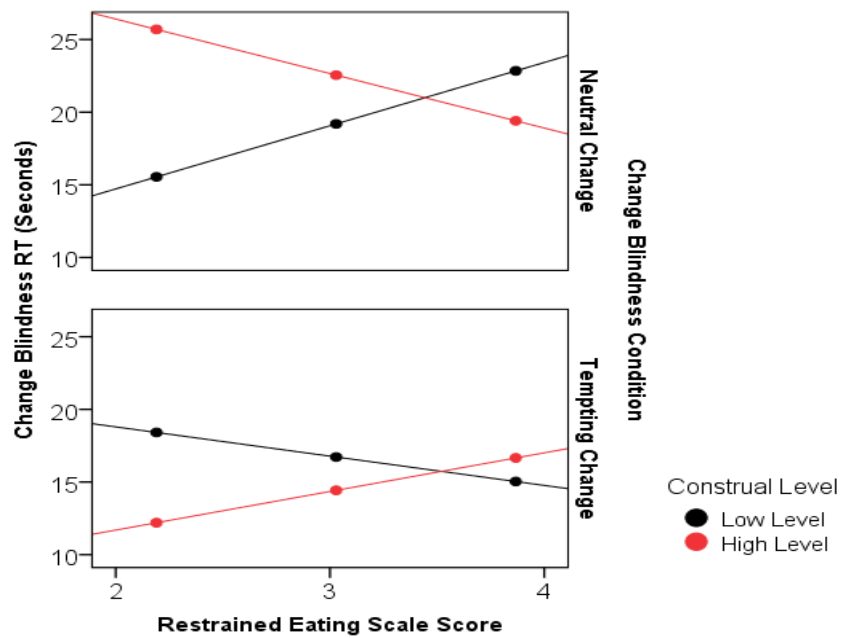


Figure 2. A regression model predicting change blindness reaction time from RES score, construal level, change type and all interactions.

Table 1, full analysis model.

Model	B estimate	T value	P value
Change Blindness condition	-5.4994	-2.6191	.0098
Mean RES	.2635	.1965	.8445
Construal Level condition	.3704	.1762	.8604
Mean RES x change blindness cond.	.4782	.1765	.8601
Mean RES x CL cond.	-1.3504	-.4884	.6261

Change blindness cond. x CL cond.	-5.6495	-1.3379	.1832
Mean RES x CL cond. x change blindness cond.	12.7712	2.2860	.0238

Figure 3.

	High-Level Construal	Low-Level Construal
Neutral Change Blindness Condition	N = 41 Mean = 22.75 SD = 13.68	N = 25 Mean = 19.88 SD = 12.84
Tempting Change Blindness Condition	N = 34 Mean = 14.44 SD = 9.98	N = 40 Mean = 16.82 SD = 12.02

Discussion

In analyzing the effect of dieting, construal level and change blindness condition on the detection of changes, we found that in the high-level construal dieting lead to slower noticing of tempting stimuli. This is in line with our hypothesis that construal level influences attentional bias toward temptation. Specifically, we found that dieting lead to slower noticing of tempting changes while in the high-level construal, and dieting lead to faster noticing of the tempting change condition in the low-level construal.

Previous studies have used the change blindness paradigm to show that attentional biases towards temptations exist in many domains (B. C. Jones et al., 2002). However, this experiment was a first attempt both at trying to manipulate this attentional bias and at utilizing a construal manipulation to do so. Thus, although results were significant for our main interaction of interest, reasonable caution should be used in their interpretation.

One major limitation to our study is that the bulk of the interaction was found in the neutral condition. When separate analyses were conducted for the neutral and tempting change blindness conditions, we found the effect was driven more (as indexed by its significance in each analysis) by the neutral condition. Dieting, in the high-level construal condition, lead to faster identification of the neutral change than it did in the low-level construal condition. Conversely, dieting, in the high-level construal condition lead to slower identification of the change in the tempting change condition than it did in the low-level construal, but by less of a margin than in the neutral change blindness condition. Our predictions, on the other hand, pertained mostly to the bias toward temptation. Note, however, that in both the temptation change and the neutral change conditions, the tempting food was present in the image. The trending interaction in the neutral change condition might therefore still be explained by a bias of attention towards the tempting food and away from the critical neutral object. However, this interpretation is post-hoc and should be corroborated by future studies.

Thus, future research is needed in this direction. First, replicating this study, as well as performing similar studies where construal level is predicted to influence attentional bias, would be an important step in understanding how construal level effects manifest. Future research may also consider varying the experimental design in order to achieve higher power. While higher power can be achieved simply by increasing sample size, additional changes to design should also be considered. The research method we used was a between-subjects design

in which only one trial of change detection occurred, because we sided with previous researchers who indicated a concern that having multiple change blindness trials would lead to participants developing search strategies. However, a within-subjects design would have significantly more power to detect the predicted effects, and should therefore be considered in future work. Moreover, replicating this study with slightly altered variables (e.g. using the “Why-How” task, or using different images) would improve the internal validity of our results. Replications with different target populations who have been shown to have preexisting attentional biases (i.e. alcohol or drug users) would make these results more generalizable to self-control as a whole.

If it were shown that construal level inductions consistently produced effects in attentional bias, it would mean that the direction of attention is influenced by the way a situation is mentally construed. Attentional bias would therefore be another way in which construal level may influence behavior. For example, it is possible that when a dieter is engaged in high-level thinking, she may simply not notice the presence of a chocolate cake because her higher level goals will have been activated.

Thus, if this initial research is substantiated, we would have better insight into the mechanism by which construal level manifests. Understanding this mechanism would show us that not only evaluations, but also attention can be changed by construal level induction. With this knowledge, we could imagine a construal level intervention that focuses on how construal level can help with our harmful biases toward tempting environmental stimuli.

APPENDIX

Dieting questions

Measures of dieting goals (Restrained Eating Scale):

Responses will be made on a 5 point Likert scale unless specified otherwise.

When you have put on weight, do you eat less than you usually do?

Do you try to eat less at meal times than you would like to eat?

How often do you refuse food or drink offered because you are concerned about your weight?

Do you watch exactly what you eat?

Do you deliberately eat foods that are slimming?

When you have eaten too much, do you eat less than usual the following day?

Do you deliberately eat less in order not to become heavier?

How often do you try not to eat between meals because you are watching your weight?

Do you take into account your weight with what you eat?

BMI:

What is your height (in inches)? (open ended response)

What is your weight (in pounds)? (open ended response)

Dichotomous dieting question:

Are you now watching what you eat in order to lose weight?

Subjective dieting success:

How successful are you at losing weight?

How successful are you at watching your weight?

How difficult is it for you to stay in shape?

How easy is it for you to stay at your preferred weight?
 How successful have you been at maintaining your preferred weight?
 How difficult is it for you to stay at your preferred weight?
 How easy do you think it would be for you to diet successful in the future, if you decided to lose weight?

Demographics

What is your gender? (Male or female)
 What is your birth year? (open ended response)

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